AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

1.   (currently amended) A method for programming non-volatile memory, comprising:

categorizing a set of non-volatile storage elements into three or more groups based on a detected behavior of said non-volatile storage elements; and

programming said non-volatile storage elements using a different programming condition for each group.

2.   (currently amended) A The method according to claim 1, wherein:

said step of programming includes applying different bit line voltages for different groups.

3.   (currently amended) A The method according to claim 1, wherein:

said step of programming includes applying a program signal to said non-volatile storage elements via a common word line and applying different bit line voltages for different groups.

4.   (currently amended) A The method according to claim 1, wherein:

said step of categorizing includes determining programming speed information of said non-volatile storage elements relative to each other, each group including non-volatile storage elements with similar programming speed information.

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5.　　(currently amended) A The method according to claim 1, wherein:

said step of categorizing includes determining programmability of said non-volatile

storage elements relative to each other, each group including non-volatile storage elements with

similar programmability.

6.　　(currently amended) A The method according to claim 1, wherein:

said step of categorizing includes applying one or more non-zero source voltages to said

set of non-volatile storage elements and, while applying said one or more non-zero source

voltages, characterizing threshold voltages of said set of non-volatile storage elements by

applying one or more positive voltages to control gates for said non-volatile storage elements and

determining whether said non-volatile storage elements turn-on in order to determine whether

said non-volatile storage elements have a threshold voltage greater than a negative voltage

compare point.

7.　　(currently amended) A The method according to claim 1, wherein:

said step of categorizing includes charging bit lines for said set of non-volatile storage

elements, applying a control gate signal and allowing said bit lines to discharge; and

said step of programming said non-volatile storage elements using a different

programming condition for each group includes adjusting a subset of bit line voltages based on

how said bit lines discharged.

8.　　(currently amended) A The method according to claim 1, further comprising:

applying initial programming to said non-volatile storage elements prior to said step of

programming said non-volatile storage elements using a different programming condition, said

step of categorizing is based on said step of applying initial programming.

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9.   (currently amended) A The method according to claim 8, wherein:

said initial programming and said step of programming said non-volatile storage elements using a different programming condition are performed using a common program signal.

10.   (currently amended) A The method according to claim 9, wherein:

said common program signal is applied via a common word line; and

said step of adjusting includes determining which of said non-volatile storage elements are slow to program, determining which of said non-volatile storage elements are fast to program and raising a voltage on bit lines for said non-volatile storage elements that are determined to be fast to program.

11.   (currently amended) A The method according to claim 8, wherein:

said step of applying initial programming is performed until at least one non-volatile storage element reaches a target threshold value; and

said step of categorizing is performed for non-volatile storage elements that did not yet reach said target threshold value.

12.   (currently amended) A The method according to claim 1, wherein:

said non-volatile storage elements are multi-state storage elements.

13.   (currently amended) A The method according to claim 1, wherein:

said non-volatile storage elements are multi-state NAND flash memory elements.

14.   (currently amended) A system for programming non-volatile memory, comprising:

a set of non-volatile storage elements;

a set of control lines in communication with said set of non-volatile storage elements; and

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a controlling circuit in communication with said control lines, said controlling circuit causes a categorizing of said set of non-volatile storage elements into three or more groups based on <u>a detected</u> behavior of said non-volatile storage elements and causes programming of said non-volatile storage elements using a different programming condition for each group.

15.   (currently amended) A̶ <u>The</u> system according to claim 14, wherein:

said control lines includes a set of bit lines and a common word line;

said controlling circuit causes application of a program signal on said common word line; and

said different program condition for each group pertains to different bit line voltages.

16.   (currently amended) A̶ <u>The</u> system according to claim 14, wherein:

said categorizing includes determining programming speed information of said non-volatile storage elements relative to each other, each group including non-volatile storage elements with similar speed information.

17.   (currently amended) A̶ <u>The</u> system according to claim 14, wherein:

said categorizing includes determining ~~programming speed information~~ <u>programmability</u> of said non-volatile storage elements relative to each other, each group including non-volatile storage elements with similar speed information.

18.   (currently amended) A̶ <u>The</u> system according to claim 14, wherein:

said ~~step of~~ categorizing includes applying a non-zero source voltage to said set of non-volatile storage elements and, while applying said non-zero source voltage, characterizing threshold voltages of said set of non-volatile storage elements by applying one or more positive voltages to control gates for said non-volatile storage elements and determining whether said non-volatile storage elements turn-on in order to determine whether said non-volatile storage elements have a threshold voltage greater than a compare point.

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19.   (currently amended) A̶ The system according to claim 14, wherein:

said categorizing includes charging bit lines for said set of non-volatile storage elements, applying a common control gate signal and allowing said bit lines to discharge; and

said programming of said non-volatile storage elements using a different programming condition for each group includes adjusting a subset of bit line voltages based on how said bit lines discharged.

20.   (currently amended) A̶ The system according to claim 14, wherein:

said controller circuit causes initial programming to said non-volatile storage elements prior to said programming said non-volatile storage elements using a different programming condition, said categorizing is based on said initial programming.

21.   (currently amended) A̶ The m̶e̶t̶h̶o̶d̶ system according to claim 20, wherein:

said initial programming is performed until at least one non-volatile storage element reaches a target threshold value; and

said categorizing is performed for non-volatile storage elements that did not yet reach said target threshold value.

22.   (currently amended) A̶ The system according to claim 20, wherein:

said initial programming is performed using a common word line signal.

23.   (currently amended) A̶ The system according to claim 14, wherein:

said non-volatile storage elements are multi-state storage elements.

24.   (currently amended) A̶ The system according to claim 14, wherein:

said non-volatile storage elements are multi-state NAND flash memory elements.

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25.   (original) A method for programming non-volatile memory, comprising:

applying initial programming to non-volatile storage elements until at least one non-volatile storage element reaches a target threshold value; and

adjusting programming of at least a subset of non-volatile storage elements that have not reached said target threshold value based on behavior of said non-volatile storage elements that have not reached said target threshold value.

26.   (currently amended) A The method according to claim 25, further comprising:

characterizing said non-volatile storage elements that have not reached said target threshold value based on programmability, said step of adjusting is based on said step of characterizing.

27.   (currently amended) A The method according to claim 26, wherein:

said step of characterizing includes comparing a predetermined threshold voltage to threshold voltages for said non-volatile storage elements that have not reached said target threshold value.

28.   (currently amended) A The method according to claim 27, wherein:

said step of adjusting includes raising bit line voltages for non-volatile storage elements that have threshold voltages greater than said predetermined threshold voltage.

29.   (currently amended) A The method according to claim 25, further comprising:

said step of applying initial programming to non-volatile storage elements includes applying a common program voltage signal to said non-volatile storage elements, said common program voltage signal increases at a first rate; and

said step of adjusting includes increasing said common program voltage signal above said first rate.

30.   (currently amended) A The method according to claim 25, further comprising:

said step of applying initial programming to non-volatile storage elements and said step of adjusting include applying a common program voltage signal to said non-volatile storage elements.

31.   (currently amended) A The method according to claim 25, further comprising:

said step of applying initial programming to non-volatile storage elements and said step of adjusting include applying a common program voltage signal to control gates of said non-volatile storage elements.

32.   (currently amended) A The method according to claim 25, wherein:

said step of adjusting includes applying a non-zero source voltage to at least a subset of said non-volatile storage elements and comparing threshold voltages of said subset of non-volatile storage elements to a predetermined positive control gate value while applying said non-zero source voltage in order to determine programmability of said subset of non-volatile storage elements.

33.   (currently amended) A The method according to claim 25, wherein:

said step of adjusting includes charging bit lines for at least a subset of said non-volatile storage elements, applying a control gate signal to said subset of said non-volatile storage elements and allowing said bit lines to discharge; and

said step of adjusting further includes adjusting a subset of said bit line voltages for programming based on how said bit lines discharged.

34.   (currently amended) A The method according to claim 25, wherein:

said non-volatile storage elements are multi-state storage elements.

35. (currently amended) A The method according to claim 25, wherein:

said non-volatile storage elements are multi-state NAND flash memory elements.

36. (original) A system for programming non-volatile memory, comprising:

a set of non-volatile storage elements;

control lines in communication with said set of non-volatile storage elements; and

a controlling circuit in communication with said control lines, said controlling circuit causes initial programming of said non-volatile storage elements until at least one non-volatile storage element reaches a target threshold value, said controlling circuit causes adjustment of programming of at least a subset of non-volatile storage elements that have not reached said target threshold value based on behavior of said non-volatile storage elements that have not reached said target threshold value.

37. (currently amended) A The system according to claim 36, wherein:

said controlling circuit causes characterization of non-volatile storage elements that have not reached said target threshold value based on programmability, said adjustment of programming is based on said characterization.

38. (currently amended) A The system according to claim 37, wherein:

said characterization includes comparing a predetermined threshold voltage to threshold voltages for said non-volatile storage elements that have not reached said target threshold, said predetermined threshold voltage is lower than said target threshold value.

39. (currently amended) A The system according to claim 38, wherein:

said adjustment of programming includes raising bit line voltages for non-volatile storage elements that have threshold voltages greater than said predetermined threshold voltage.

40.   (currently amended) A The system according to claim 36, wherein:

said initial programming includes applying a common program voltage signal to said non-volatile storage elements, said common program voltage signal increases at a first rate; and

said adjustment of programming includes increasing said common program voltage signal above said first rate.

41.   (currently amended) A The system according to claim 36, wherein:

said initial programming includes applying a common program voltage signal to said non-volatile storage elements.

42.   (currently amended) A The system according to claim 36, wherein:

said adjustment of programming includes applying a non-zero source voltage to at least a subset of said non-volatile storage elements and comparing threshold voltages of said subset of non-volatile storage elements to a predetermined positive control gate value while applying said non-zero source voltage in order to determine programmability of said subset of non-volatile storage elements.

43.   (currently amended) A The system according to claim 36, wherein:

said adjustment of programming includes charging bit lines for at least a subset of said non-volatile storage elements, applying a control gate signal to said subset of said non-volatile storage elements and allowing said bit lines to discharge; and

said adjustment of programming further includes adjusting a subset of said bit line voltages for prgraming programming based on how said bit lines discharged.

44.   (currently amended) A The system according to claim 36, wherein:

said non-volatile storage elements are multi-state storage elements.

45.   (currently amended) A The system according to claim 36, wherein:

said non-volatile storage elements are multi-state NAND flash memory elements.

46.   (original) A method for programming non-volatile memory, comprising:

applying an initial program signal to a set of non-volatile storage elements;

applying one or more non-zero source voltages to said set of non-volatile storage

elements after commencing said initial program signal;

while applying said one or more non-zero source voltages, characterizing threshold

voltages of said set of non-volatile storage elements by applying one or more positive voltages to

control gates for said non-volatile storage elements and determining whether said non-volatile

storage elements turn-on in order to determine whether said non-volatile storage elements have a

threshold voltage greater than a compare point; and

adjusting a programming parameter of at least a subset of said non-volatile storage

elements based on said step of characterizing.

47.   (currently amended) A The method according claim 46, wherein:

said compare point is a negative voltage.

48.   (currently amended) A The method according to claim 46, wherein:

said initial program signal is applied via a common word line; and

said adjusting said programming parameter includes raising a voltage on one or more bit

lines for said non-volatile storage elements.

49.   (original) A system for programming non-volatile memory, comprising:

a set of non-volatile storage elements;

control lines in communication with said set of non-volatile storage elements; and

a controlling circuit in communication with said control lines, said controlling circuit

causes:

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application of an initial program signal to said set of non-volatile storage elements,

while applying one or more non-zero source voltages, characterization of threshold voltages of said set of non-volatile storage elements by applying a voltage to control gates for said non-volatile storage elements and determining whether said non-volatile storage elements turn-on in order to determine whether said non-volatile storage elements have a threshold voltage greater than a compare point; and

adjustment of control line voltages of at least a subset of said non-volatile storage elements based on said step of characterizing.

50.   (currently amended) A̶ The system according to claim 49, wherein:

said control lines includes a set of bit lines and a common word line;

said initial program signal is applied via said common word line; and

said adjustment of said control line voltages includes raising one or more bit line voltages.

51.   (original) A method for programming non-volatile memory, comprising:

applying an initial program signal to a non-volatile storage element;

applying a verify signal to a control gate for said of non-volatile storage element after commencing said applying of said initial program signal;

charging a bit line for said of non-volatile storage element after commencing said applying of said initial program signal;

allowing said bit line to discharge; and

adjusting a programming parameter of said non-volatile storage elements based on said bit line discharging.

52.   (currently amended) A̶ The method according to claim 51, wherein:

said initial program signal is applied via a common word line; and

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said adjusting of said programming parameter includes raising a bit line voltage for said non-volatile storage element for subsequent programming.

53.   (currently amended) A The method according to claim 51, wherein:
said non-volatile storage element is a flash memory device.

54.   (original) A system for programming non-volatile memory, comprising:
a set of non-volatile storage elements;
a word line in communication with said set of non-volatile storage elements;
a set of bit lines in communication with said set of non-volatile storage elements; and
a controlling circuit in communication with said word line, said control lines, and said non-volatile storage elements, said controlling circuit causes:

application of an initial program signal to said non-volatile storage elements,

application of a verify signal at a word line for said of non-volatile storage elements after commencing said initial program signal,

charging of bit lines for said of non-volatile storage elements after commencing said initial program signal,

allowing of said bit lines to discharge,

adjustment of a programming parameter of at least a subset of said non-volatile storage elements based on said bit line discharging, and

completion of programming of said non-volatile storage elements using said adjusted programming parameter.

55.   (currently amended) A The system according to claim 54, wherein:
said initial program signal is applied via said word line, said word line is common to all said non-volatile storage elements; and
said adjustment of said programming parameter includes raising one or more of said bit lines.

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56.   (currently amended) A The system according to claim 54, wherein:

said program parameter is adjusted differently for different non-volatile storage elements.

57.   (currently amended) A The system according to claim 54, wherein:

said non-volatile storage elements are flash memory devices.